



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
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October 24, 2018

Mr. Bryan C. Hanson
Senior VP, Exelon Generation Company, LLC
President and CNO, Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

**SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2—NRC
INTEGRATED INSPECTION REPORT 05000254/2018003; 05000265/2018003;
07200053/2018001 AND 07200053/2018002**

Dear Mr. Hanson:

On September 30, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Quad Cities Nuclear Power Station, Units 1 and 2. On October 2, 2018, the NRC inspectors discussed the results of this inspection with Mr. K. Ohr, Site Vice President, and other members of your staff. The results of this inspection are documented in the enclosed report.

Based on the results of this inspection, the NRC has identified one issue that was evaluated under the risk significance determination process as having very low safety significance (Green). Additionally, the NRC has identified one issue that was evaluated using the NRC Enforcement Policy and Enforcement Manual (traditional enforcement) and was determined to be of very low safety significance (Severity Level IV). The NRC has also determined that two violations are associated with these issues. Because the licensee initiated condition reports to address these issues, these violations are being treated as a Non-Cited Violations (NCVs), consistent with Section 2.3.2 of the Enforcement Policy. The NCVs are described in the subject inspection report.

If you contest the violations or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region III; the Director, Office of Enforcement; and the NRC Resident Inspector at the Quad Cities Nuclear Power Station.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Karla Stoedter, Chief
Branch 1
Division of Reactor Projects

Docket Nos. 50-254; 50-265; 72-053
License Nos. DPR-29; DPR-30

Enclosure:
IR 05000254/2018003; 05000265/2018003;
07200053/2018001; 07200053/2018002

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Letter to Bryan Hanson from Karla Stoedter dated October 24, 2018

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2—NRC
INTEGRATED INSPECTION REPORT 05000254/2018003; 5000265/2018003;
07200053/2018002 AND 07200053/2018001

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 50-254; 50-265; 72-053

License Nos: DPR-29; DPR-30

Report No: 05000254/2018003; 05000265/2018003;
07200053/2018001; 07200053/2018002

Enterprise Identifier: I-2018-003-0025

Licensee: Exelon Generation Company, LLC

Facility: Quad Cities Nuclear Power Station, Units 1 and 2

Location: Cordova, IL

Dates: July 1 through September 30, 2018

Inspectors: R. Murray, Senior Resident Inspector
K. Carrington, Resident Inspector
L. Rodriguez, Reactor Inspector
N. Feliz Adorno, Reactor Inspector
N. Fields, Health Physicist Inspector
M. Learn, Reactor Engineer
C. Mathews, IEMA Resident Inspector

Approved by: K. Stoedter, Chief
Branch 1
Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee’s performance by conducting an integrated quarterly inspection at Quad Cities Nuclear Generating Station, Units 1 and 2, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC’s program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information. Findings and violations being considered in the NRC’s assessment are summarized in the table below.

List of Findings and Violations

Failure to Maintain the Design Basis for Residual Heat Removal Torus Suction Valve			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000254/2018003-01 Closed	N/A	71111.15 – Operability Determinations and Functionality Assessments
The inspectors identified a Green finding and associated Non-Cited Violation of Title 10 of the <i>Code of Federal Regulations</i> (10 CFR) 50, Appendix B, Criterion III, “Design Control,” when the licensee performed an in-field adjustment to the torque switch settings on the Unit 1 residual heat removal (RHR) torus suction valve 1-1001-7C and failed to ensure measures were established to assure the valve could continue to meet its design basis requirements.			

Failure to Follow Procedures for Forced Helium Dehydration of a Multipurpose Canister			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
N/A	Severity Level IV (Traditional Enforcement) NCV 05000254/2018003-02; 05000265/2018003-02; 07200053/2018002-01 Closed	N/A	60855.1 – Operation of an Independent Spent Fuel Storage Installation at Operating Plants
The inspectors identified a Severity Level IV Non-Cited Violation of 10 CFR 72.150 when the licensee failed to follow procedures for the setup of the multipurpose canister (MPC) forced helium dehydration (FHD) system. Specifically, during the setup for processing MPCs during the 2018 Independent Spent Fuel Storage Installation (ISFSI) loading campaign, the licensee failed to follow procedure OU-MW-671-200, “MPC Processing FHD for BWRs,” Revision 1, Attachment 9, Step 1.2.1, which connected inlet and outlet hosing between the FHD skid and FHD manifold.			

Additional Tracking Items

None

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PLANT STATUS

Unit 1

The unit was operated at or near full rated thermal power from July 1 to September 26, 2018, with the exception of planned power reductions for turbine testing, control rod pattern adjustments, and other short-term power changes as requested by the transmission system operator. On September 26, 2018, the unit experienced a turbine load rejection and an automatic SCRAM from 100 percent power during switchyard restoration activities associated with off-site, 345 kilovolt (kV), Line 0401. The unit was placed into a hot shutdown condition and entered Forced Outage Q1F66. On September 28, 2018, the unit entered Mode 2—Startup, and reached Mode 1, Power Operation, the same day. On September 29, 2018, operators synchronized the unit's main turbine generator to the grid, and operators continued power ascension to full rated thermal power. On September 30, 2018, the unit reached full power where it operated at or near for the remainder of the inspection period.

Unit 2

The unit was operated at or near full rated thermal power for the entire inspection period, with the exception of planned power reductions for turbine testing, control rod pattern adjustments, and other short-term power changes as requested by the transmission system operator.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program—Operations Phase." The inspectors performed plant status activities described in IMC 2515 Appendix D, "Plant Status," and conducted routine reviews using IP 71152, "Problem Identification and Resolution." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.01—Adverse Weather Protection

External Flooding (1 Sample)

The inspectors evaluated readiness to cope with external flooding on August 8, 2018.

71111.04—Equipment Alignment

Partial Walkdown (3 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) Unit 1 High Pressure Coolant Injection (HPCI) system during Unit 1 Reactor Core Isolation Cooling (RCIC) system planned maintenance and testing, on July 11, 2018;
- (2) Unit 1B subsystem during Unit 1A Residual Heat Removal System (RHR)/ RHRSW (residual heat removal service water) subsystems planned maintenance, on July 23, 2018; and
- (3) Unit 1A RHRSW system during Unit 1C RHRSW system planned maintenance, on August 14, 2018.

71111.05AQ—Fire Protection Annual/Quarterly

Quarterly Inspection (4 Samples)

The inspectors evaluated fire protection program implementation in the following selected areas:

- (1) Fire Zone SBO-4, Unit 2 Station Blackout (SBO) Diesel Generator Room, Elevation 595'-0", SBO Building, on July 25, 2018;
- (2) Fire Zone 8.2.7.E, Unit 2 Turbine Building, Elevation 615'-6", North Mezzanine Floor, on August 10, 2018;
- (3) Fire Zone 9.3, Unit 1/2 Reactor Building, Elevation 595'-0", 1/2 Diesel Generator, on September 28, 2018; and
- (4) Fire Zone 1.1.1.2, Unit 1 Reactor Building, Elevation 595'-0", Ground Floor, September 28, 2018.

71111.06—Flood Protection Measures

Internal Flooding (1 Sample)

The inspectors evaluated internal flooding mitigation protections in the U2 RHRSW vaults on August 2, 2018.

71111.07—Heat Sink Performance

Heat Sink (1 Sample)

The inspectors evaluated the Unit 2 emergency diesel generator (EDG) jacket cooling water heat exchanger performance during the weeks of July 18, 2018, and August 31, 2018.

71111.11—Licensed Operator Requalification Program and Licensed Operator Performance

Operator Requalification (1 Sample)

The inspectors observed and evaluated operators in the control room simulator during requalification training on September 17, 2018.

Operator Performance (1 Sample)

The inspectors observed and evaluated operators on Unit 1 respond to a temperature control valve failure in the reactor building closed cooling water (RBCCW) system and increasing drywell temperatures, on August 24, 2018. The inspectors observed and evaluated operators on Unit 2

perform testing and troubleshooting of the 'C' RHR pump following planned maintenance on September 20, 2018.

71111.12—Maintenance Effectiveness

Routine Maintenance Effectiveness (1 Sample)

The inspectors evaluated the effectiveness of routine maintenance activities associated with the following equipment and/or safety significant function:

- (1) Turbine control valves.

71111.13—Maintenance Risk Assessments and Emergent Work Control (3 Samples)

The inspectors evaluated the risk assessments for the following planned and emergent work activities:

- (1) Emergent work associated with the degraded Delta T and high temperatures on the Unit 2 EDG that resulted in online risk change to yellow during the week of July 16, 2018;
- (2) Site safety stand down and work stoppage due to increased number of OSHA-recordable injuries, emergent work associated with Unit 1 reactor water cleanup (RWCU) isolation, and subsequent reactor water chemistry excursion during the week of July 31, 2018; and
- (3) Severe thunderstorms impacting work activities and both units' online risk change to yellow during the weeks of August 19, 2018, and September 4, 2018.

71111.15—Operability Determinations and Functionality Assessments (6 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

- (1) Issue Report (IR) 4148330: U2 EDG Trip During QCOS 6600-42, 06/19/2018;
- (2) IR 4162608: 2B CS Room Floor Drain Valve Failed QCOS 0020.04, 08/08/2018;
- (3) IR 4166453: Drywell Equipment Drain Sump Pump Flow is Degraded, 08/23/2018;
- (4) IR 1416606: Galling Potential Identified on 1-1001-7C/D (Unit 1 RHR Suction Valves), 09/21/2012;
- (5) IR 4170073: Unit 1 HPCI Flow Controller Erratic, 09/05/2018; and
- (6) Engineering Change (EC) 624284: Control Room Envelope Heat Load Analysis for Loss of One TXV [thermal expansion valve], 07/12/2018.

71111.19—Post Maintenance Testing (4 Samples)

The inspectors evaluated the following post maintenance tests:

- (1) Unit 2 Emergency diesel generator load test following emergent maintenance associated with degraded heat exchanger performance on July 19, 2018;
- (2) Unit ½ 'B' Diesel Driven Fire Pump Annual Capacity Test following annual planned maintenance and water pump replacement on August 1, 2018;

- (3) Unit ½ 'A' Diesel Driven Fire Pump Annual Capacity Test following annual planned maintenance and replacement of fire pump discharge relief valve on August 16, 2018; and
- (4) Unit 2C RHR pump operability test following planned system maintenance on September 20, 2018.

71111.22—Surveillance Testing

The inspectors evaluated the following surveillance tests:

Routine (2 Samples)

- (1) QCOS 6600–43: Unit ½ Emergency Diesel Generator Load Test, on July 23, 2018; and
- (2) QCOS 6620–01: [Unit 2] SBO Diesel Generator (DG) 1(2) Quarterly Load Test, on August 2, 2018.

In-service (2 Samples)

- (1) QCOS 1100–07: Unit 1A Standby Liquid Control (SBLC) Pump Flow Rate Test, on July 23, 2018; and
- (2) QCOS 1300–05: [Unit 2] RCIC Pump Operability Test, on August 21, 2018.

OTHER ACTIVITIES – BASELINE

71151—Performance Indicator Verification (4 Samples)

The inspectors verified licensee performance indicators submittals listed below:

- (1) MS05: Safety System Functional Failures (SSFFs) Sample–2 Samples (July 1, 2017–June 30, 2018); and
- (2) MS06: Emergency AC Power Systems–2 Samples (July 1, 2017–June 30, 2018).

71152—Problem Identification and Resolution

Annual Follow-Up of Selected Issues (1 Sample)

The inspectors reviewed the licensee's implementation of its corrective action program related to the following issue:

- (1) IR 4148330: Unit 2 EDG Tripped on High Temperature and IR 4156181: Unit 2 EDG Elevated Temps During Monthly Load Test.

71153—Follow-Up of Events and Notices of Enforcement Discretion

Events (2 Samples)

- (1) On July 31, 2018, the inspectors evaluated the licensee's response to an isolation of the Unit 1 RWCU system (Group 3 isolation) coincident with the receipt of a half Group I primary containment system isolation signal. The licensee identified that a main steam tunnel temperature switch failure caused the signals to occur. All equipment responded as expected following the temperature switch failure. Additionally, the inspectors

evaluated the licensee's response to a subsequent Unit 1 reactor water chemistry excursion that occurred on that same day, while the licensee was returning the RWCU system to service.

- (2) On September 26, 2018, Unit 1 experienced a turbine load rejection and automatic reactor SCRAM from full power. The inspectors evaluated the licensee's response to the SCRAM and follow-up actions, including Forced Outage Q1F66 activities that occurred from September 26 to September 28, 2018. This sample included control room observations of shutdown and startup activities.

OTHER ACTIVITIES—TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL

60853—On-Site Fabrication of Components and Construction of an Independent Spent Fuel Storage Installation

From November 20, 2017, to August 8, 2018, the inspector evaluated the licensee's fabrication of components and its construction of a second independent spent fuel storage installation pad. This new ISFSI pad is designed to hold 114 HI-STORM 100 casks, which will be built to Certificate of Compliance 72-1014, Amendment 8, Revision 1. Results of earlier inspections related to this ISFSI pad were already documented in NRC Integrated Inspection Report 05000254/2017004, 05000265/2017004, and 07200053/2017001. Specifically, the inspector evaluated:

- (1) the modulus of elasticity of the subgrade material of the ISFSI pad by reviewing plate load test reports;
- (2) the procurement of ISFSI pad components in accordance with specifications by reviewing rebar certifications and the ISFSI pad concrete mix design;
- (3) the installation of rebar and the preparation for pouring concrete by performing a walkdown of the installed rebar for Sections B and H of the ISFSI pad on June 12, 2018;
- (4) the delivery, placement, testing, finishing, and curing of concrete by observing the licensee's concrete pour activities for Sections B and H on June 13, 2018;
- (5) the compressive strength of the ISFSI pad by reviewing compressive strength test reports for concrete cylinders taken from concrete placed into sections A, C, G, and J of the ISFSI pad; and
- (6) the 72.48 screening performed for the installation of the second ISFSI pad.

60855.1—Operation of an Independent Spent Fuel Storage Installation at Operating Plants

The inspector evaluated the licensee's operation of the independent spent fuel storage installation from August 13 to September 25, 2018. Specifically, the inspector evaluated:

- (1) the material and radiological condition of the ISFSI and loaded storage casks through independently observing the structural condition, and both performing independent radiological surveys and reviewing the licensee's radiological surveys;
- (2) a heavy lift of the loaded transfer cask from the spent fuel pool to the cask processing area;
- (3) welding of the root and intermediate passes of an MPC;
- (4) non-destructive evaluations of the lid to shell weld of an MPC;
- (5) processing of an MPC for storage, including drying using FHD;
- (6) the fuel selection and loading for the MPC loaded on August 27, 2018; and

- (7) changes to the 72.212 report and changes screened and evaluated using 10 CFR 72.48 and 50.59.

INSPECTION RESULTS

71111.15—Operability Determinations and Functionality Assessments

Failure to Maintain the Design Basis for Residual Heat Removal Torus Suction Valve			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000254/2018003-01 Closed	Not Applicable	IP 71111.15 – Operability Determinations and Functionality Assessments
<p>The inspectors identified a Green finding and associated Non-Cited Violation (NCV) of Title 10 of the <i>Code of Federal Regulations</i> (10 CFR) 50, Appendix B, Criterion III, “Design Control,” when the licensee performed an in-field adjustment to the torque switch settings on RHR torus suction valve 1-1001-7C and failed to ensure measures were established to assure the valve could continue to meet its design basis requirements.</p>			
<p><u>Description:</u></p> <p>In 2012, the licensee identified a potential galling concern for Unit 1 RHR torus suction valves 1-1001-7C and 1-1001-7D. Specifically, the licensee documented the Joint Owner’s Group Motor Operated Valve Program indicated that valves with stainless steel discs in sliding contact with stainless steel seats are susceptible to galling when exposed to differential pressure forces and temperatures greater than 120 degrees Fahrenheit. Valves 7C and 7D have similar stainless steel discs and seats (these are the only valves with this susceptibility). Testing was performed by the Electric Power Research Institute (EPRI) and published in EPRI Report 1000885, “Friction and Galling Performance of SA-351-CF8 Stainless Steel.” The report discussed a galling concern for the loaded faces of the valve that could potentially prevent valve movement, depending on temperature and differential pressure conditions.</p> <p>The licensee documented the concern in IR 1416606, “Galling Potential Identified on 1-1001-7C/D,” on September 21, 2012. The operability evaluation documented in IR 1416606 determined the valves would maintain their ability to function up to 60 psig reactor steam dome pressure, when in Mode 3. Under normal (Mode 1) operating conditions, the 7C and 7D valves are open and not subject to differential pressure forces of concern (torus pressure on one side and pump suction pressures on other). When the licensee transitions into Mode 3 and shutdown cooling is required to be placed into service, the 7C and 7D valves would need to be closed. Once they are closed and shutdown cooling (SDC) is placed into operation, the valves are subject to reactor pressures on one side and torus pressures on the other side of the valves. Depending on the operating conditions during Mode 3 (i.e. steam dome pressure), the valve could be subject to galling that may impact the valves ability to open.</p> <p>Technical Specification Limiting Condition for Operation (LCO) 3.4.7, “Residual Heat Removal (RHR) Shutdown Cooling System—Hot Shutdown,” requires SDC to be operable in Mode 3</p>			

with steam dome pressure below the RHR cut-in permissive pressure limit (93 psig decreasing, in accordance with QCOP 1000–05, “Shutdown Cooling Operation”).

Technical Specification LCO 3.5.1, “Emergency Core Cooling Systems—Operating,” requires that the low pressure coolant injection (LPCI) mode of RHR is Operable in Modes 1, 2, and 3. The issue of concern identified in IR 1416606 is that should the RHR 7C and 7D valves be operated (normally open and would need to be closed for SDC operation) above 60 psig steam dome pressure, there was a concern the differential pressure across the valves would be high enough that galling of the valve seat and disc could cause the valves to become inoperable and render the LPCI mode of RHR inoperable.

As a corrective action from IR 1416606, the licensee made a procedure change to QCOP 1000–05, which limited operators from placing the ‘B’ loop of SDC into operation until reactor pressure was less than or equal to 60 psig (7C and 7D valves are in the ‘B’ loop). The licensee had also planned corrective actions to replace the valves during the next Refueling Outage (RFO) Q1R23, in March 2015. For circumstances outside of the licensee’s control, the 7C and 7D valves were unable to be replaced in RFO Q1R23, and the project to replace the valves was rescheduled for RFO Q1R25, in March 2019.

The inspectors identified the galling issue for the 7C and 7D valves during a Plant Health Committee presentation in August 2018. After reviewing IR 1416606 and supporting calculations and documentation, the inspectors asked clarifying questions to the licensee. In researching the inspectors’ questions, the licensee identified that in RFO Q1R23 in March 2015, the licensee made in-field torque switch adjustments to the 7C valve, which changed the friction factor of the valve in a non-conservative direction. The licensee calculated the new maximum steam dome pressure the valve would be able to reliably perform its function was 45 psig reactor steam dome pressure (versus the 60 psig previously calculated in 2012). The licensee captured the issue in IR 4171765, “MO 1–1001–7C May Not Open During Mode 3 LOCA [loss-of-coolant accident],” dated September 11, 2018.

The sizing calculation (Midacalc) of record for these valves, QUA–1–1001–7C and QUA–1–1001–7D, Revision 6, used a maximum required opening differential pressure of 51 psid, as calculated in QDC–1000–M–1318, “Residual Heat Removal System Combined DBD and DP Calculation,” Revision 000. Calculation QDC–1000–M–1318 uses an incorrect assumption for the worse case opening condition for the valve because it failed to account for the Mode 3 loss of coolant accident with SDC in service. Following the identification of the issue in IR 1416606, the licensee failed to update the differential pressure calculation to reflect the most restrictive design basis conditions for the valve. Additionally during the 2015 RFO Q1R23, the licensee failed to recognize that the torque switch adjustments made to the 7C valve would have an impact on the valve’s operation.

Corrective Action: Licensee made a change to procedure QCOP 1000–05 to reflect the more conservative reactor steam dome pressure limit of 45 psig prior to placing the B loop of SDC into service. The licensee has a planned work order to replace the Unit 7C and 7D valves in RFO Q1R25 in 2019.

Corrective Action Reference: IR 4171765: MO 1–1001–7C May Not Open During Mode 3 LOCA

Performance Assessment:

Performance Deficiency: The licensee performed an in-field adjustment to the torque switch settings on RHR torus suction valve 1-1001-7C and failed to ensure measures were established to assure the valve could continue to meet its design basis requirements.

Screening: The inspectors determined the performance deficiency was more than minor because it adversely affected the Design Control attribute of the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the failure to assure the design basis was maintained had the potential to lead to, or could have resulted in, the Unit 1B loop LPCI mode of RHR not being available to perform its function under certain design basis operating conditions.

Significance: The inspectors assessed the significance of the finding using SDP Appendix G, "Shutdown Operations." The inspectors determined the finding was of very low safety significance (Green) because the LPCI Mode of RHR never lost its ability to function and the inspectors answered "yes" to question A.1 in Exhibit 3, Mitigating System Screening Questions.

Cross-cutting Aspect: The inspectors did not identify a cross-cutting aspect related to this issue because it was greater than 3 years old and did not reflect current licensee performance.

Enforcement:

Violation: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. It further requires that design changes, including field changes, be subject to design control measures commensurate with those applied to the original design.

Contrary to the above, during RFO Q1R23 in March 2015, the licensee performed a field change and failed to subject it to design control measures commensurate with the original design. Specifically, the licensee performed an in-field adjustment to the torque switch settings on RHR torus suction valve 1-1001-7C and failed to ensure measures were established to assure the valve could continue to meet its design basis requirements, which are, to be operated at any time during Mode 3 and continue to be able to perform its LPCI function to open.

Disposition: This violation is being treated as a NCV, consistent with Section 2.3.2 of the Enforcement Policy.

60855.1—Operation of an Independent Spent Fuel Storage Installation at Operating Plants

Failure to Follow Procedures for Forced Helium Dehydration of a Multipurpose Canister			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV (Traditional Enforcement) NCV 05000254/2018003-02; 05000265/2018003-02; 07200053/2018002-01 Closed	Not Applicable	60855.1 – Operation of an Independent Spent Fuel Storage Installation at Operating Plants
<p>The inspectors identified a Severity Level IV NCV of 10 CFR 72.150 when the licensee failed to follow procedures for the setup of the MPC FHD system. Specifically, during the setup for processing MPCs during the 2018 ISFSI loading campaign, the licensee failed to follow procedure OU-MW-671-200, "MPC Processing FHD for BWRs," Revision 1, Attachment 9, Step 1.2.1, which connected inlet and outlet hosing between the FHD skid and FHD manifold.</p> <p><u>Description:</u></p> <p>On August 30, 2018, the inspector conducted an equipment alignment (configuration control) walkdown of the FHD system operating on the sixth MPC of the licensee's 2018 ISFSI loading campaign.</p> <p>The FHD system is used to remove the remaining moisture in an MPC after the bulk water has been drained. The system functions by circulating heated dry helium through the MPC. The helium evaporates the water remaining in the MPC, and the moisture-laden helium is then routed back to the FHD system skid where a demister removes the entrained water.</p> <p>Over the previous 2 days, the FHD system had been operating at a reduced flow rate through the MPC because the system motor kept tripping on thermal overload when operators attempted to run the system at the normal flow rate. The reduced flow rate precluded the licensee from demonstrating the sixth MPC had been dried in accordance with the applicable Technical Specification (TS) dryness limits of Surveillance Requirement (SR) 3.1.1.1.</p> <p>During the configuration control review, the inspector identified the inlet and outlet hosing from the FHD skid to the FHD manifold had been switched, resulting in reversed flow through the MPC. The inspector subsequently identified this line-up was not in accordance with licensee procedure OU-MW-671-200, "MPC Processing FHD for BWRs," Revision 1, Attachment 9, Step 1.2.1. Since the hoses did not need to be disconnected during the drying of the first 5 MPCs, the swapped hoses had been in place since the beginning of the campaign on June 4, 2018.</p> <p>As part of its investigation following the inspector's identification of the swapped hoses, the licensee determined that during the initial processing of the first MPC the temperature indications on the inlet and outlet temperature gauges had given unexpected readings and so operators switched the labels on the gauges. A corrective action document, however, had not been generated for the label issue, an action not in accordance with licensee procedure PI-AA-120, "Issue Identification and Screening Process," Revision 8. In addition, after operators switched the labels, an independent verification that the labels had been placed on the correct component using verification practices in accordance with licensee procedure OP-AA-116-101, "Equipment Labeling," Revision 2, was not performed.</p>			

Corrective Actions: The licensee entered LCO 3.1.1, Condition A, as it determined there was not reasonable assurance that SR 3.1.1.1 had been met without further evaluation for the five previously loaded MPCs. The licensee subsequently performed EC 625388, "DCS FHD Configuration Discrepancy," which concluded that SRs 3.1.1.1, 3.1.1.2, and 3.1.1.3 were indeed met even with reversed flow. The licensee identified the configuration of the internal drain tube connected to the drain port on the first five MPCs was different than the configuration of the tube in the sixth MPC. The licensee postulated that this difference, in conjunction with thermal expansion of the tube due to the reversed flow of heated helium, resulted in the need for the reduced flow in the sixth MPC.

The licensee shut down the FHD system, and placed the MPC in a known safe configuration. The licensee then met with staff and reinforced the need for procedure use and adherence. The procedure was then revised to allow switching back the hoses, and the revised procedure was successfully tested on a mock-up MPC that did not contain nuclear fuel. The licensee subsequently switched the hoses on the loaded sixth MPC and completed the drying without incident.

Corrective Action References: IRs 04168081 and 04168791

Performance Assessment:

In accordance with Section 2.2 of the Enforcement Policy and Inspection Manual Chapter 0612, Appendix B, "Issue Screening," ISFSIs are not subject to the Significance Determination Process and are not subject to the Reactor Oversight Process, so violations identified at ISFSIs are assessed using traditional enforcement. Traditional enforcement violations are not assessed for cross-cutting aspects.

Enforcement:

Violation: Title 10 CFR 72.150 requires the licensee to prescribe activities affecting quality by documented instructions, procedures, or drawings of a type appropriate to the circumstances and requires that these instructions, procedures, and drawings be followed.

Contrary to the above, from June 4 to August 30, 2018, the licensee failed to follow instructions, procedures, or drawings of a type appropriate to the circumstances. Specifically, the licensee failed to follow procedure OU-MW-671-200, "MPC Processing Forced Helium Dehydration for BWRs," Revision 1, Attachment 9, Step 1.2.1. Specifically, the licensee did not connect the inlet and outlet hoses for the forced helium dehydration system as specified in the procedure.

Severity: The inspectors assessed the significance of the violation using the NRC Enforcement Policy and Enforcement Manual. Consistent with the guidance in Section 1.2.6.D of the Enforcement Manual, if a violation does not fit an example in the Enforcement Policy Violation Examples, it should be assigned a severity level: (1) commensurate with its safety significance; and (2) informed by similar violations addressed in the Violation Examples. The inspectors found no similar violations in the violation examples. Subsequent determinations identified that no design basis limits were exceeded due to this issue, therefore the violation was determined to be of very low safety significance (Severity Level IV).

Enforcement Action: This violation is being treated as a NCV, consistent with Section 2.3.2 of the Enforcement Policy.

71152—Problem Identification and Resolution

Observation	71152—Annual Sample Review
<p data-bbox="201 298 1308 361">IR 4148330: Unit 2 EDG Tripped on High Temperature and IR 4156181: Unit 2 EDG Elevated Temps During Monthly Load Test</p> <p data-bbox="201 394 1419 596">On June 19, 2018, the Unit 2 EDG tripped on high jacket water cooling temperature during its monthly surveillance test. This high temperature trip is bypassed when there is an emergency start signal present. The licensee’s troubleshooting efforts did not identify any conclusive evidence for the cause of the jacket water cooling issue. Based on a support and refute matrix, the licensee decided to replace the engine-driven jacket water pump and performed inspections and cleaning of the jacket water heat exchangers.</p> <p data-bbox="201 630 1419 961">On July 16, 2018, during the next scheduled surveillance test, the licensee identified concerns with jacket water temperatures using thermography the licensee had been performing based on the issues identified in June. The licensee noted the engine was able to pass all surveillance requirements during the July 16, 2018, test; however, the licensee decided to take the diesel out of service and perform additional inspections. During a borescope examination of the heat exchanger, the licensee identified evidence of micro-fouling that could have been impacting the ability of the heat exchanger to transfer heat. The licensee performed a more extensive cleaning of the heat exchanger and subsequent testing showed a significant improvement in heat exchanger performance. The Unit 2 EDG was declared operable and returned to service on July 19, 2018.</p> <p data-bbox="201 995 1409 1432">Based on the two events described, the licensee performed an equipment corrective action program evaluation (ECAPE) under IR 4148330. In this evaluation, the licensee determined the most likely cause of the heat exchanger fouling was due to dredging that had occurred in April 2018, around the same time the Unit 2 EDG 24-hour endurance run surveillance test took place. The higher amounts of suspended sediment present at the intake, due to the dredging, made its way into the heat exchanger. The inspectors noted that heat exchanger inspection methods could vary (i.e. visual vs. borescope) and the acceptance criteria for the various types of fouling could be subjective due to differences between heat exchanger inspectors. Additionally, the licensee could perform a variety of cleaning methods depending on the inspection results. With the type of fouling identified in July, the licensee had to use more abrasive techniques (than were employed in June) in order to clean the heat exchanger effectively. The inspectors determined that this event was an example of a weakness in the licensee’s ability to identify a condition adverse to quality (heat exchanger degradation).</p> <p data-bbox="201 1465 1403 1696">The inspectors noted several additional planned corrective actions from the ECAPE, including: revising the guidance for heat exchanger inspections to better identify micro-fouling; update and provide guidance for proper cleaning of EDG heat exchangers in order to maximize efficiency and maintain maximum design margin; and planning work orders to inspect the other EDGs as part of their extent of condition evaluation. The licensee did not expect the other EDGs (Units 1 and ½) to be impacted based on temperature trends from completed surveillances.</p>	

EXIT MEETINGS AND DEBRIEFS

The inspectors confirmed that proprietary information was controlled to protect from public disclosure. No proprietary information was documented in this report.

- On August 8, 2018, the inspector presented the ISFSI pad inspection results to Mr. K. Ohr, Site Vice President, and other members of the licensee staff via telephone conference.
- On October 2, 2018, the inspectors presented the quarterly integrated inspection and ISFSI inspection results to Mr. K. Ohr, Site Vice President, and other members of the licensee staff.

DOCUMENTS REVIEWED

71111.04—Equipment Alignment

- QOM 1–1000–04; Unit 1 RHR Valve Checklist; Revision 11
- Drawing M–37; Diagram of RHR Service Water Piping; Revision BI
- IR 4166051; NRC ID: Debris in 1A RHRSW HP INBD Bearing Housing; 08/21/2018
- QOM 1–1000–05; U1 RHR Service Water Valve Checklist; Revision 23

71111.05AQ—Fire Protection Annual/Quarterly

- Quad Cities Generating Station Pre-fire Plan; April 2014
- Quad Cities Generating Station Pre-fire Plan; February 2017

71111.07—Heat Sink Performance

- EC 625010; U2 EDG Projected Engine Outlet Water Temperature at Maximum Load; Revision 0
- Drawing M–69, Sheet 3; Diagram of Service Water Piping Diesel Generator Cooling Water; Revision R
- Drawing M–22, Sheet 3; Diagram of Service Water Piping Diesel Generator Cooling Water; Revision AA
- Drawing M–22, Sheet 5, Diagram of Service Water Piping; Revision Z
- IR 4156181; U2 EDG Elevated Temps During Monthly Load Test; 07/16/2018
- ECAPE 4148330; U2 EDG Trip During QCOS 6600-42; 08/22/2018
- ER-AA-340; GL 89–13 Program Implementing Procedure; Revision 9
- ER-AA-340–1002; Service Water Heat Exchanger Inspection Guide; Revision 7
- ER-AA-340–1001; GL 89–13 Program Implementation Instructional Guide; Revision 11
- ER-AA-340–2000; Balance-of-Plant Heat Exchanger Inspection, Testing and Maintenance Guide; Revision 9
- Calc No. QDC–6700–E–1503; Calculation Page; Revision 011
- QCMMS 6600-07; Emergency Diesel Generator Heat Exchanger Service Water Side Clean and Inspection; Revision 6
- IR 4148330; U2 EDG Trip During QCOS 6600–42; 06/19/2018
- WO 1916398; Open/Inspect Diesel Generator HX; 03/22/2018
- WO 1916397; Open/Inspect Diesel Generator HX; 03/22/2018
- QCOS 6600–57; Unit 2 Diesel Generator Endurance and Margin/Full Load Reject/Hot Restart Test; Revision 8
- QCOS 5750–09; ECCS Room and DGCWP Cubicle Cooler Monthly Surveillance; Revision 37

71111.12—Maintenance Effectiveness

- ER-AA-310-1003; Maintenance Rule - Performance Criteria Selection; Revision 5

71111.13—Maintenance Risk Assessments and Emergent Work Control

- Work Week Safety Profiles

71111.15—Operability Determinations and Functionality Assessments

- EC 624284; Control Room Envelope Heat Load Analysis for Loss of One TXV; 07/12/2018
- IR 4062552; 'B' Train CREV Superheat Value High; 10/13/2017
- WO 1918839-01; MM Adjust Temp Exp Valve 0-5741-341A on 'B' CR HVAC Syst; 10/13/2017
- Drawing 931126AY; 14"-150# Gate Valve, BW, Motor Operated; Revision 1
- EC 04-01284M; Replacement of MO1-1001-7C Valve; 08/11/1995
- IR 1416606; Galling Potential Identified on 1-1001-7C/D; 09/21/2012
- IR 2496550; MO 1-1001-7C and 1-1001-7D Not Replaced During Q1R23; 05/06/2015
- Letter 0124827; Procurement of Replacement Valves for Residual Heat Removal (RHR) System MO-1-1001-7A, B, C, D Valves; 02/21/1994
- QUA-1-1001-7C; MIDACALC Results, QUA-1-1001-7C (QUA-1), AC Motor Operated GL96-05 Gate Valve; Revision 6
- QUA-1-1001-7D; MIDACALC Results, QUA-1-1001-7D (QUA-1), AC Motor Operated GL96-05 Gate Valve; Revision 6
- WR Q60582; 1D RHR Pump Suction Valve Replacement; 09/06/1994
- IR 4170073; U1 HPCI FIC 1-2340-1 Erratic When in Standby; 09/05/2018
- CC-AA-201; Plant Barrier Control Program; Revision 12
- Drawing M-85; Diagram of Reactor Building Equipment Drains; Revision CN
- QCOP 0020-04; Use of Plugs in Reactor Building Floor Drain Lines; Revision 1
- QCOS 0020-04; Reactor Building Floor Drain Sump Ball Valve Leakage Testing; Revision 3
- QCTP 0130-11; Internal Flood Protection Program; Revision 5
- EC 625010; U2 EDG Projected Engine Outlet Water Temperature at Maximum Load; Revision 0
- ECAP 4148330; U2 EDG Trip During QCOS 6600-42; 08/09/2018
- IR 4148330; U2 EDG Trip During QCOS 6600-42; 06/19/2018
- Letter from Engine Systems, Inc. to Exelon EDG/SBODG Senior Systems Manager; 09/05/2018

71111.19—Post Maintenance Testing

- WO 4676246; (LR) Diesel Fire Pump 'B' Capacity Test; 08/03/2018
- WO 4598327-01; Perform Diesel Fire Pump Capacity Test; 08/14/2018
- QCOS 5750-09; ECCS Room and DGCWP Cubicle Cooler Monthly Surveillance; Revision 37
- QCOS 6600-57; Unit 2 Diesel Generator Endurance And Margin/Full Load Reject /Hot Restart Test; Revision 8
- Drawing M-27, Sheet 1; Diagram of Fire Protection System; Revision QN
- QCMMS 4100-33; ½-4101B Diesel Driven Fire Pump Annual Capacity Test; Revision 33
- QCOS 6600-57; Unit 2 Diesel Generator Endurance Margin/Full Load Reject/Hot Restart; Revision 8

71111.20—Refueling and Other Outage Activities

- QCGP 1–1; Normal Unit 1 Startup; Revision 112
- EC 622330; Q1C25 Startup Sequence and Notch Worth Evaluation 7500 through 14500 MWD/MTU; Revision 0

71111.22—Surveillance Testing

- QCOS 1100–07; SBLC Pump Flow Rate Test; Revision 38
- QCOS 6600–43; Unit ½ Emergency Diesel Generator Load Test; Revision 48
- IR 4166083; RCIC Pressure Indicator Fluctuation; 08/21/2018
- QCOS 1300–05; RCIC Pump Operability Test; Revision 56
- WO 4789995–01; RCIC Pump Operability Test (IST); 08/21/2018

71151—Performance Indicator Verification

- EC 0000397569–000; Review of Loss of Secondary Containment DP Noted in IR 1629224; 04/10/2014
- ECR 0000434663; Review EC Eval 397569 Against IR 4099281; 04/23/2018
- IR 4099281–04; Received Unexpected U2 Fuel Pool Radiation Alarm; 03/23/2018

71152—Problem Identification and Resolution

- IR 4160504; NSR Fuse Replaced; 07/31/2018
- IR 4166305; OM Code Non-Conformance- Relief Valve Exceeded 10 YR Limit; 08/22/2018
- IST–QDC–Plan; 10CFR50.55a Relief Request; RV–01
- ECAPE 4160251–06; Unexpected Alarm 901–5 D9, Chan ‘A’ Main Steam Tunnel Hi Temp; 09/20/2018
- IR 4166684; OOT, 2–1705–16A, Trend Code B4; 08/23/2018
- IR 4166687; OOT, 2–1705–16B, Trend Code B4; 08/23/2018
- IR 4170073; U1 HPCI FIC 1-2340-01 Erratic When in Standby; 09/05/2018
- Drawing 4E–6613A; Schematic Diagram Motor Operated Valves 0–2901–6 and 0–2901–7 Safe Shutdown System; Revision H
- QCOP 2900–01; Safe Shutdown Makeup Pump System Preparation for Standby Operation; Revision 39

71153—Follow-Up of Events and Notices of Enforcement Discretion

- CY–AB–120–100; Reactor Water Chemistry; Revision 19
- CY–QC–160–200; Chemistry Excursions and Adverse Trends/Conditions; Revision 2
- IR 4160251; Unexpected Alarm 901–5 D9, Chan ‘A’ Main Steam Tunnel Hi Temp; 07/31/2018
- IR 4160631; Unit 1 Resin Intrusion Event; 08/01/2018
- IR 4161425; 4.0 Critique for Unit 1 Chemistry Excursion; 08/03/2018
- IR 4177502; Unit 1 Reactor Scram from 100% Reactor Power; 09/27/2018
- Unit 1 Operator Logs from 07/31/2018 to 08/01/2018
- QCOP 6400-35; Performing Transmission Switching Orders; Revision 15
- QCIS 0200–20; Unit 1 Reactor High Pressure Automatic Blowdown Calibration and Functional Test; Revision 16
- Drawing 4E–1338; Schematic Diagram Generator and Transformer Tripping Relays Primary System; Revision AX

60853—On-site Fabrication of Components and Construction of an ISFSI

- IR 04147163; NRC ID. ISFSI Concrete Density Test Not Performed; 06/14/2018
- Attachment to Letter No. 2017–QDC–205; S&L Review of Terracon’s “Plate Load Test Report” dated 10/11/2017; 10/17/2017
- CC–AA–103–100; Configuration Change Control for Permanent Physical Plant Changes; Revision 0
- Certificate of Accreditation for Terracon Consultants, Inc. in Bettendorf, Iowa, USA; 06/22/2017
- Certifications for Terracon Concrete Field Testing Personnel
- EC 405175; Dry Cask Storage Project Installation of ISFSI Pad 2; Revision 000
- EC 405175; WPI Attachment 2; Concrete Preparation & Execution Checklist; Revision 000
- PI–AA–120; Issue Identification and Screening Process; Revision 8
- PI–AA–125; Corrective Action Program (CAP) Procedure; Revision 6
- Quad Cities Generating Station ISFSI Expansion Project Specific ISFSI Pours A–C & G–J Plan; 05/24/2018
- QC–72.48–S–17–0001; Dry Cask Storage Project Installation of ISFSI Pad 2; 06/12/2017
- QCNPS 10 CFR 72.212 Evaluation Report; Revision 12
- RRTI–2144–011; Response to Request for Technical Information (RRTI) Holtec International; Revision 0
- Specification Q–2052; ISFSI Expansion ISFSI Pad, Final Grading and Misc. Concrete Structures; 05/01/2017
- 07161047.0146; Concrete Compressive Strength Test Report; 07/02/2018
- 07161047.0149; Concrete Compressive Strength Test Report; 07/02/2018
- Terracon Project No. 07161047; Plate Load Test Submittal; 09/19/2017
- CM–001–08–10; Terracon Quality Management System Manual; Revision 4.3
- Submittal 2 Rev 1; Rebar Shops Revised ISFSI PAD; 07/14/2017
- Submittal 3; Rebar Shops REVISED Apron; 07/14/2017
- Submittal 3 Cert; Rebar Certifications + Tests; 10/04/2017
- Terracon Project No. 07161047; Plate Load Test Report; 10/11/2017
- Submittal 3 Cert R1; Rebar Test Certifications; 10/30/2017
- Submittal 16 R7; Re: Mix #41 Concrete Submittal; 04/18/2018
- EC 405175; Revision Summary including AWA 1 through AWA 14; 05/30/2018
- ACI 311.6–09; Specification for Ready Mixed Concrete Testing Services; November 2009
- 07161047.0160; Concrete Cylinder Density Report; 06/28/2018
- HI–2022444; HI-STORM 100 System FSAR; Revision 11.1
- IR 04075816; ISFSI Expansion Mud Mat Compressive Strength; 11/17/2017

60855.1—Operation of an Independent Spent Fuel Storage Installation at Operating Plants

- QC–00–18–00205; 2018 Spent Fuel Dry Cask Storage Project ALARA Plan; 05/07/2018
- QDC–0836–N–2323; Quad Cities Fuel Selection Package for 2018 Campaign—ISFSI; 04/24/2018
- SA Report 4099184; Quad Cities Spent Fuel Loading Campaign Readiness Assessment; 04/20/2018
- QCNPS 10 CRR 72.212 Evaluation Report; Revision 13
- WO 04588877; ISFSI Lift Yoke Inspection; 01/19/2018
- WO 04592088; ISFSI MPC Lift Cleat Inspection; 01/04/2018
- WO 04643972; EM Reactor Building Overhead Crane; 05/04/2018
- ISFSI Corrective Action Program Documents; 2017–2018
- Reactor Building Overhead Crane Corrective Action Program Documents; 2017–2018

- RP-AA-305; Holtec HI-TRAC Radiation Surveys; Revision 000
- RP-AA-306; Holtec HI-STORM Radiation Surveys; Revision 000
- RP-AA-307; Holtec ISFSI Radiation Survey; Revision 000
- QCFHP 0800-82; MPC Unloading Operations; Revision 006
- QCFHP 0800-72; HI-STORM Processing; Revision 011
- QCFHP 0800-70; HI-TRAC Loading Operations; Revision 20
- OU-MW-671-200; MPC Processing Forced Helium Dehydration for BWRs; Revision 001
- OU-MW-671-200; MPC Processing Forced Helium Dehydration for BWRs; Revision 002
- OU-MW-671-200; MPC Processing Forced Helium Dehydration for BWRs; Revision 002A
- PI-CNSTR-OP-H-EXE-01; Closure Welding of Holtec Multi-Purpose Canisters at Exelon Facilities; Revision 18
- MSLT-MPC-EXELON-ON-MW; Helium Mass Spectrometer Leak Test Procedure Multi-Purpose Canister; Revision 2
- H2-MON-002; Hydrogen Monitoring for Holtec Canisters; Revision 10
- HI-2022966; Forced Helium Dehydrator Sourcebook; Revision 4
- AR 04163723; U-2 Refuel Bridge Main Hoist Load Cell Abnormal Indication; 08/13/2018
- AR 04163993; U-2 Refuel Bridge Main Trolley Position Indication Erratic; 08/13/2018
- AR 04168081; FHD Unit Trips Due to High Temperature Alarm; 08/29/2018
- AR 04168791; DCS-FHD System Processing Configuration Discrepancy; 08/30/2018
- PI-AA-120; Issue Identification and Screening Process; Revision 8
- OP-AA-116-101; Equipment Labeling; Revision X